

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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|-------------|---|-----------------|-------------|
| Applicant: | David C. Collins et al. | Examiner: | Grant Sitta |
| Serial No.: | 10/821,135 | Group Art Unit: | 2629 |
| Filed: | April 8, 2004 | Docket No.: | 200400517-1 |
| Title: | GENERATING AND DISPLAYING SPATIALLY OFFSET SUB-FRAMES | | |

APPEAL BRIEF UNDER 37 C.F.R. §41.37

Mail Stop Appeal Brief – Patents

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir/Madam:

This Appeal Brief is submitted in support of the Notice of Appeal filed on October 20, 2008 appealing the final rejection of claims 1-21 and 23-25 of the above-identified application as set forth in the Final Office Action mailed August 21, 2008 (hereafter Final Office Action).

The U.S. Patent and Trademark Office is hereby authorized to charge Deposit Account No. 08-2025 in the amount of \$540.00 for filing a Brief in Support of an Appeal as set forth under 37 C.F.R. §41.20(b)(2). At any time during the pendency of this application, please charge any required fees or credit any overpayment to Deposit Account No. 08-2025.

Appellant respectfully requests consideration and reversal of the Examiner's rejection of pending claims 1-21 and 23-25.

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(A) REAL PARTY IN INTEREST

The real party in interest is Hewlett-Packard Development Company, LP having a principal place of business at 20555 S.H. 249 Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

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(B) RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellant that will have a bearing on the Board's decision in the present Appeal.

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(C) STATUS OF CLAIMS

In a Final Office Action mailed August 21, 2008, claims 1-21 and 23-25 were finally rejected. Claims 26-33 were allowed. Claims 3-12, 15-19, 21 and 23-25 were objected to. Claims 1-21 and 23-33 are pending in the application. Claim 22 has been canceled without prejudice as to the subject matter contained therein. Claims 1-21 and 23-25 are the subject of the present Appeal.

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(D) STATUS OF AMENDMENTS

No amendments have been entered subsequent to the Final Office Action mailed August 21, 2008.

(E) SUMMARY OF THE CLAIMED SUBJECT MATTER

The Summary is set forth as an exemplary embodiment as the language corresponding to independent claims 1, 13, and 20. Discussions about elements of claims 1, 13, and 20 can be found at least at the cited locations in the specification and drawings.

Independent claim 1 claims a method of displaying an image with a display device (p. 6, line 1 to p. 13, line 24; p. 35, line 1 to p. 43, line 4; Figs. 1-4E and 19-23). The method comprises receiving image data for the image, the image data comprising a first set of pixels (p. 6, lines 25-32; p. 35, lines 1-15; p. 40, lines 1-11; Fig. 1, ref. no. 28; Fig. 19, ref. no. 28), generating first and second sub-frames, wherein the first and the second sub-frames comprise a second set of pixels, wherein each of the second set of pixels is centered relative to a respective one of the first set of pixels (p. 35, line 16 to p. 39, line 31; p. 40, line 12 to p. 43, line 4; Fig. 1, ref. no. 30; Fig. 19, ref. nos. 1412A, 1422A, 1432A, and 1442A; Fig. 21, ref. nos. 1412B, 1422B, 1432B, and 1442B; Fig. 23, ref. nos. 1704A, 1704B, 1704C, and 1704D), and alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position (p. 9, lines 16 to p. 13, line 24; p. 39, lines 17-24; Fig. 1, ref. nos. 14 and 26; Figs. 2A-2C; Figs. 3A-3E; Figs. 4A-4E; Figs. 19A-19E).

Independent claim 13 claims a system for displaying an image (p. 6, line 1 to p. 13, line 24; p. 35, line 1 to p. 43, line 4; Figs. 1-4E and 19-23). The system comprises a buffer adapted to receive image data for the image, the image data comprising a first set of pixels (p. 6, lines 25-32; p. 35, lines 1-15; p. 40, lines 1-11; Fig. 1, ref. nos. 22 and 28; Fig. 19, ref. no. 28), an image processing unit configured to define first, second, third, and fourth sub-frames comprising a second set of pixels, wherein each of the second set of pixels is centered on a respective one of the first set of pixels (p. 35, line 16 to p. 39, line 31; p. 40, line 12 to p. 43, line 4; Fig. 1, ref. nos. 24 and 30; Fig. 19, ref. nos. 1412A, 1422A, 1432A, and 1442A; Fig. 21, ref. nos. 1412B, 1422B, 1432B, and 1442B; Fig. 23, ref. nos. 1704A, 1704B, 1704C, and 1704D), and a display device adapted to alternately display the first sub-frame in a first position, the second sub-frame in a second position spatially offset from the first position, the third sub-frame in a third position spatially offset from the first position and the second position, and the fourth sub-frame in a fourth position spatially offset from the first position,

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the second position, and the third position (p. 9, lines 16 to p. 13, line 24; p. 39, lines 17-24; Fig. 1, ref. nos. 14 and 26; Figs. 3A-3E; Figs. 4A-4E; Figs. 19A-19E).

Independent claim 20 claims a system for generating first, second, third, and fourth sub-frames for display at spatially offset positions to generate the appearance of an image (p. 6, line 1 to p. 13, line 24; p. 35, line 1 to p. 43, line 4; Figs. 1-4E and 19-23). The system comprises means for receiving image data corresponding to the image (p. 6, lines 25-32; p. 35, lines 1-15; p. 40, lines 1-11; Fig. 1, ref. nos. 22 and 28; Fig. 19, ref. no. 28), means for generating the first, the second, the third, and the fourth sub-frames using the image data, each of the first, second, third, and fourth sub-frames comprising a plurality of sub-frame pixel values that correspond to a plurality of sub-frame pixels wherein each of the plurality of sub-frame pixels are centered with respect to a respective one of a plurality of pixels of the image data (p. 35, line 16 to p. 39, line 31; p. 40, line 12 to p. 43, line 4; Fig. 1, ref. nos. 24 and 30; Fig. 19, ref. nos. 1412A, 1422A, 1432A, and 1442A; Fig. 21, ref. nos. 1412B, 1422B, 1432B, and 1442B; Fig. 23, ref. nos. 1704A, 1704B, 1704C, and 1704D), means for calculating a plurality of simulated image pixel values for a simulated image by convolving each of the sub-frame pixel values with at least four other sub-frame pixel values (p. 36, line 29 to p. 37, line 32; p. 40, line 21 to p. 41, line 32; Fig. 1, ref. nos. 24; Fig. 20, ref. nos. 1500, 1502, and 1504; Fig. 22, ref. nos. 1600, 1602, and 1604), and means for updating the first, the second, the second, the third, and the fourth sub-frames in accordance with a difference between the simulated image and the image data (p. 38, line 1 to p. 39, line 31; p. 42, line 1 to p. 43, line 4; Fig. 1, ref. nos. 24; Fig. 21, ref. no. 1504, 1520, 1522, 1526, and 1530; Fig. 23, ref. no. 1604, 1700, 1702, and 1704).

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(F) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

- I. Claim 1 stands rejected on the ground of nonstatutory double patenting over the following claims of the following references.
 - a. Claim 1 stands rejected on the ground of nonstatutory double patenting over claim 1 of U.S. Patent No. 7,109,981 (Damera-Venkata '981) in view of U.S. Patent Publication No. 2003/0020809 (Gibbon)
 - b. Claim 1 stands rejected on the ground of nonstatutory double patenting over claim 1 of U.S. Patent No. 7,301,549 (Damera-Venkata '549) in view of U.S. Patent Publication No. 2003/0020809 (Gibbon)
- II. Claims 1, 2, 13, 14, and 20 stand rejected under 35 U.S.C. §103(a).
 - a. Claims 1, 2, 13, and 20 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,384,816 (Tabata) in view of U.S. Patent Publication No. 2003/0020809 (Gibbon)
 - b. Claim 14 stands rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,384,816 (Tabata) in view of U.S. Patent Publication No. 2003/0020809 (Gibbon) in further view of U.S. Patent No. 6,304,245 (Groenenboom)

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(G) ARGUMENT

I. Rejection of Claim 1 on the Ground of Nonstatutory Double Patenting

The claims of the cited primary references do not teach or suggest each and every element of claim 1. In addition, the cited secondary reference (Gibbon) does not teach or suggest the elements of claim 1 that are not taught by the cited primary references.

A. The Applicable Law

The analysis employed in an obviousness-type double patenting rejection parallels the guidelines for analysis of a § 103 obviousness determination. *In re Braat*, 937 F.2d 589, 19 USPQ2d 1289 (Fed. Cir. 1991); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985).

The Examiner has the burden under 35 U.S.C. §103 to establish a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). The prior art reference or combined prior art references must teach or suggest all of the claim limitations. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). “[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007).

B. Rejection of Claim 1 on the Ground of Nonstatutory Double Patenting over claim 1 of U.S. Patent No. 7,109,981 (Damera-Venkata ‘981) in view of U.S. Patent Publication No. 2003/0020809 (Gibbon)

Claim 1 recites, inter alia:

receiving image data for the image, the image data comprising a first set of pixels;

generating first and second sub-frames, wherein the first and the second sub-frames comprise a second set of pixels, wherein each of the second set of pixels is centered relative to a respective one of the first set of pixels; and

alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position.

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As conceded in the Final Office Action on page 2, the claims of Damera-Venkata '981 do not recite "wherein each of the second set of pixels is centered relative to a respective one of the first set of pixels" as recited in claim 1.

Gibbon also does not teach or suggest this feature of claim 1. The Examiner cites the teaching of Gibbon that "the two resulting sub-images are offset by one half of a pixel in both horizontal and vertical directions", Gibbon, [0012], as a teaching or suggestion of this feature of claim 1. This teaching describes a relationship between "the two resulting sub-images" of Gibbon. The teaching does not, however, describe the spatial relationship between pixels of "the two resulting sub-images" and pixels of the image data from which "the two resulting sub-images" were created.

Claim 1 recites that "each of the second set of pixels", i.e., each of the pixels of the first and the second sub-frames, "is centered relative to a respective one of the first set of pixels", i.e., a respective one of the pixels of the image data. The teaching of Gibbon cited by the Examiner only teaches that the pixels of the first and the second sub-frames are offset from one another by one half of a pixel in both horizontal and vertical directions. The Examiner states that "Examiner is merely relying on the centered resulting sub-images of Gibbon and for Damera-Venkata to teach the relationship between sub-frames and the image data." Final Office Action, p. 10. Appellant has been unable to find any teaching or suggestion of "centered resulting sub-images of Gibbon" as asserted by the Examiner. The plain teaching of Gibbon above states that the two resulting sub-images are offset from one another and in no way suggests that either the sub-images are centered with respect to one another or with respect to the image data. Accordingly, the Examiner has set forth no teaching or suggestion in Gibbon that supports this assertion.

Because neither claim 1 of Damera-Venkata '981 nor Gibbon teach or suggest all of the features of claim 1, Appellant respectfully requests the reversal of the non-statutory double patenting rejection of claim 1 over claim 1 of Damera-Venkata '981 in view of Gibbon.

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C. Rejection of Claim 1 on the Ground of Nonstatutory Double Patenting over claim 1 of U.S. Patent No. 7,301,549 (Damera-Venkata '549) in view of U.S. Patent Publication No. 2003/0020809 (Gibbon)

Claim 1 recites, inter alia:

receiving image data for the image, the image data comprising a first set of pixels;
generating first and second sub-frames, wherein the first and the second sub-frames comprise a second set of pixels, wherein each of the second set of pixels is centered relative to a respective one of the first set of pixels; and
alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position.

As conceded in the Final Office Action on page 3, the claims of Damera-Venkata '549 do not recite "wherein each of the second set of pixels is centered relative to a respective one of the first set of pixels" as recited in claim 1.

Gibbon also does not teach or suggest this feature of claim 1 for the reasons given above in Section I(B).

Because neither claim 1 of Damera-Venkata '549 nor Gibbon teach or suggest all of the features of claim 1, Appellant respectfully requests the reversal of the non-statutory double patenting rejection of claim 1 over claim 1 of Damera-Venkata '549 in view of Gibbon.

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II. Rejection of Claims 1, 2, 13, 14, and 20 under 35 U.S.C. §103(a)

A. The Applicable Law

The Examiner has the burden under 35 U.S.C. §103 to establish a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). The prior art reference or combined prior art references must teach or suggest all of the claim limitations. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). “[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007).

B. Rejection of Claims 1, 2, 13, and 20 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,384,816 (Tabata) in view of U.S. Patent Publication No. 2003/0020809 (Gibbon)

Neither Tabata nor Gibbon teach or suggest all of the features of claims 1, 2, 13, and 20.

1. Rejection of Claims 1 and 2 under 35 U.S.C. §103(a) as being unpatentable over Tabata in view of Gibbon

Claim 1 recites, *inter alia*:

receiving image data for the image, the image data comprising a first set of pixels;
generating first and second sub-frames, wherein the first and the second sub-frames comprise a second set of pixels, wherein each of the second set of pixels is centered relative to a respective one of the first set of pixels; and
alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position.

Neither Tabata nor Gibbon teach or suggest “generating first and second sub-frames, wherein the first and the second sub-frames comprise a second set of pixels, wherein each of

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the second set of pixels is centered relative to a respective one of the first set of pixels” as recited in claim 1 (emphasis added).

Tabata does not teach or suggest this feature of claim 1. The Examiner cites the Abstract of Tabata as a teaching or suggestion of this feature of claim 1. Final Office Action, p. 4. In the abstract, Tabata teaches “a delta-array display device and pixel position transition means for repeatedly shifting the respective pixel positions of the display device to each of positions at four points.” Neither this teaching of Tabata nor the remainder of the Abstract teach or suggest the generation of sub-frames. The Abstract of Tabata also fails to teach or suggest “wherein each of the second set of pixels is centered relative to a respective one of the first set of pixels” as recited in claim 1 as conceded by the Examiner in the Final Office Action on p. 4.

Gibbon also does not teach or suggest “wherein each of the second set of pixels is centered relative to a respective one of the first set of pixels” as recited in claim 1. The Examiner cites Fig. 6, Fig. 10, and paragraph [0012] of Gibbon as a teaching or suggestion of this feature of claim 1 and asserts that “Gibbon teaches the centered special relationship between two sub-images.” Final Office Action, p. 4.

The above feature of claim 1, however, recites a relationship between the sub-frame pixels and the image data pixels. Claim 1 recites that “each of the second set of pixels”, i.e., each of the pixels of the first and the second sub-frames, “is centered relative to a respective one of the first set of pixels”, i.e., a respective one of the pixels of the image data. The cited teachings of Gibbon do not describe the spatial relationship between the pixels of the sub-images and the pixels of the image data from which the sub-images were created. Accordingly, the portions of Gibbon relied on by the Examiner do not teach or suggest the above feature of claim 1.

Appellant respectfully submits that claim 1 patentably distinguishes over the cited references for at least these reasons. Accordingly, Appellant respectfully requests that the rejection of claim 1 and claim 2 which depends from claim 1 under 35 U.S.C. §102(b) be reversed.

2. Rejection of Claim 13 under 35 U.S.C. §103(a) as being unpatentable over Tabata in view of Gibbon

Claim 13 recites, *inter alia*:

a buffer adapted to receive image data for the image, the image data comprising a first set of pixels;
an image processing unit configured to define first, second, third, and fourth sub-frames comprising a second set of pixels, wherein each of the second set of pixels is centered on a respective one of the first set of pixels; and
a display device adapted to alternately display the first sub-frame in a first position, the second sub-frame in a second position spatially offset from the first position, the third sub-frame in a third position spatially offset from the first position and the second position, and the fourth sub-frame in a fourth position spatially offset from the first position, the second position, and the third position.

Neither Tabata nor Gibbon teach or suggest “an image processing unit configured to define first, second, third, and fourth sub-frames comprising a second set of pixels, wherein each of the second set of pixels is centered on a respective one of the first set of pixels” as recited in claim 13 (emphasis added).

Tabata does not teach or suggest this feature of claim 13. The Examiner cites the “fig. 8 (5)” of Tabata as a teaching or suggestion of this feature of claim 13. Final Office Action, p. 5. In Fig. 5, Tabata teaches “video signal processing circuit 5”. Tabata does not include a teaching or suggestion that “video signal processing circuit 5” teaches or suggests the generation of sub-frames. Tabata also fails to teach or suggest “wherein each of the second set of pixels is centered on a respective one of the first set of pixels” as recited in claim 13 as conceded by the Examiner in the Final Office Action on p. 5.

Gibbon also does not teach or suggest “wherein each of the second set of pixels is centered on a respective one of the first set of pixels” as recited in claim 13. The Examiner cites Fig. 6, Fig. 10, and paragraph [0012] of Gibbon as a teaching or suggestion of this feature of claim 13 and asserts that “Gibbon teaches the centered special relationship between two sub-images.” Final Office Action, p. 5.

The above feature of claim 13, however, recites a relationship between the sub-frame pixels and the image data pixels. Claim 1 recites that “each of the second set of pixels”, i.e.,

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each of the pixels of the first and the second sub-frames, “is centered on a respective one of the first set of pixels”, i.e., a respective one of the pixels of the image data. The cited teachings of Gibbon do not describe the spatial relationship between the pixels of the sub-images and the pixels of the image data from which the sub-images were created.

Accordingly, the portions of Gibbon relied on by the Examiner do not teach or suggest the above feature of claim 13.

Appellant respectfully submits that claim 13 patentably distinguishes over the cited references for at least these reasons. Accordingly, Appellant respectfully requests that the rejection of claim 13 under 35 U.S.C. §102(b) be reversed.

3. Rejection of Claim 20 under 35 U.S.C. §103(a) as being unpatentable over Tabata in view of Gibbon

Claim 20 recites, *inter alia*:

means for receiving image data corresponding to the image;
means for generating the first, the second, the third, and the fourth sub-frames using the image data, each of the first, second, third, and fourth sub-frames comprising a plurality of sub-frame pixel values that correspond to a plurality of sub-frame pixels wherein each of the plurality of sub-frame pixels are centered with respect to a respective one of a plurality of pixels of the image data;

means for calculating a plurality of simulated image pixel values for a simulated image by convolving each of the sub-frame pixel values with at least four other sub-frame pixel values; and

means for updating the first, the second, the second, the third, and the fourth sub-frames in accordance with a difference between the simulated image and the image data.

Neither Tabata nor Gibbon teach or suggest “means for generating the first, the second, the third, and the fourth sub-frames using the image data, each of the first, second, third, and fourth sub-frames comprising a plurality of sub-frame pixel values that correspond to a plurality of sub-frame pixels wherein each of the plurality of sub-frame pixels are centered with respect to a respective one of a plurality of pixels of the image data” as recited in claim 20 (emphasis added).

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Tabata does not teach or suggest this feature of claim 20. The Examiner cites the “co. 2, lines 22-63” of Tabata as a teaching or suggestion of this feature of claim 20. Final Office Action, p. 6. This portion of Tabata does not teach or suggest the generation of sub-frames. This portion of Tabata also fails to teach or suggest “wherein each of the plurality of sub-frame pixels are centered with respect to a respective one of a plurality of pixels of the image data” as recited in claim 20 as conceded by the Examiner in the Final Office Action on p. 7.

Gibbon also does not teach or suggest “wherein each of the plurality of sub-frame pixels are centered with respect to a respective one of a plurality of pixels of the image data” as recited in claim 20. The Examiner cites Fig. 6, Fig. 10, and paragraph [0012] of Gibbon as a teaching or suggestion of this feature of claim 13 and asserts that “Gibbon teaches the centered special relationship between two sub-images.” Final Office Action, p. 7.

The above feature of claim 20, however, recites a relationship between the sub-frame pixels and the image data pixels. Claim 20 recites that “wherein each of the plurality of sub-frame pixels are centered with respect to a respective one of a plurality of pixels of the image data”. The cited teachings of Gibbon do not describe the spatial relationship between the pixels of the sub-images and the pixels of the image data from which the sub-images were created. Accordingly, the portions of Gibbon relied on by the Examiner do not teach or suggest the above feature of claim 20.

Appellant respectfully submits that claim 20 patentably distinguishes over the cited references for at least these reasons. Accordingly, Appellant respectfully requests that the rejection of claim 20 under 35 U.S.C. §102(b) be reversed.

C. Rejection of Claim 14 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,384,816 (Tabata) in view of U.S. Patent Publication No. 2003/0020809 (Gibbon) in further view of U.S. Patent No. 6,304,245 (Groenenboom)

Claim 14 depends from claim 13. Groenenboom is cited as a teaching of the features of claim 14 and does not teach or suggest the features of claim 13 that are not taught or suggested by Tabata or Gibbon as described above in Section II(B)(2).

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Accordingly, the combination of Tabata, Gibbon, and Groenenboom does not teach or suggest all of the features of claim 14, and Appellant respectfully requests that the rejection of claim 14 under 35 U.S.C. §103(a) be reversed.

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(H) CONCLUSION

For the above reasons, Appellants respectfully submit that claims 1-21 and 23-25 have not been established to be obvious in view of the cited references. Accordingly, Appellants respectfully request that the Examiner be reversed.

Any inquiry regarding this Response should be directed to either Roger Greer at Telephone No. (312) 360-0080, Facsimile No. (312) 360-9315 or Christopher P. Kosh at Telephone No. (512) 241-2403, Facsimile No. (512) 241-2409. In addition, all correspondence should continue to be directed to the following address:

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Title: GENERATING AND DISPLAYING SPATIALLY OFFSET SUB-FRAMES

CLAIMS APPENDIX

1. A method of displaying an image with a display device, the method comprising:
receiving image data for the image, the image data comprising a first set of pixels;
generating first and second sub-frames, wherein the first and the second sub-frames
comprise a second set of pixels, wherein each of the second set of pixels is centered relative
to a respective one of the first set of pixels; and
alternating between displaying the first sub-frame in a first position and displaying the
second sub-frame in a second position spatially offset from the first position.
2. The method of claim 1 further comprising:
generating third and fourth sub-frames, wherein the third and the fourth sub-frames
comprise the second set of pixels, wherein each of the second set of pixels is centered relative
to one of the first set of pixels; and
alternating between displaying the first sub-frame in the first position, displaying the
second sub-frame in the second position spatially offset from the first position, displaying the
third sub-frame in a third position spatially offset from the first position and the second
position, and displaying the fourth sub-frame in a fourth position spatially offset from the
first position, the second position, and the third position.
3. The method of claim 2 further comprising:
generating a simulated image by convolving the first, the second, the third, and the
fourth sub-frames with an interpolating filter.
4. The method of claim 3 wherein the interpolating filter comprises a 3x3 interpolating
filter with nine filter coefficients.
5. The method of claim 4 wherein the nine filter coefficients comprise first, second, and
third rows which each comprise three coefficients, wherein the three coefficients of the first
row have values of 1/16, 2/16, and 1/16, respectively, wherein the three coefficients of the

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second row have values of $2/16$, $4/16$, and $2/16$, respectively, and wherein the three coefficients of the third row have values of $1/16$, $2/16$, and $1/16$, respectively.

6. The method of claim 4 wherein the nine filter coefficients comprise first, second, and third rows which each comprise three coefficients, wherein the three coefficients of the first row have values of 0, $1/8$, and 0, respectively, wherein the three coefficients of the second row have values of $1/8$, $4/8$, and $1/8$, respectively, and wherein the three coefficients of the third row have values of 0, $1/8$, and 0, respectively.

7. The method of claim 3 further comprising:
generating an error image by subtracting the simulated image from the image data.

8. The method of claim 7 further comprising:
generating first, second, third, and fourth correction sub-frames from the error image;
and
generating fifth, sixth, seventh, and eighth sub-frames by adding the first, the second, the third, and the fourth correction sub-frames to the first, the second, the third, and the fourth sub-frames, respectively.

9. The method of claim 3 further comprising:
generating an error image by subtracting the simulated image from the image data to generate error data and by convolving the error data with an error filter.

10. The method of claim 9 wherein the error filter comprises a 3×3 error filter with nine filter coefficients.

11. The method of claim 10 wherein the nine filter coefficients comprise first, second, and third rows which each comprise three coefficients, wherein the three coefficients of the first row have values of $1/16$, $2/16$, and $1/16$, respectively, wherein the three coefficients of the second row have values of $2/16$, $4/16$, and $2/16$, respectively, and wherein the three coefficients of the third row have values of $1/16$, $2/16$, and $1/16$, respectively.

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12. The method of claim 9 further comprising:
generating first, second, third, and fourth correction sub-frames from the error image;
and
generating fifth, sixth, seventh, and eighth sub-frames by adding the first, the second, the third, and the fourth correction sub-frames to the first, the second, the third, and the fourth sub-frames, respectively.
13. A system for displaying an image, the system comprising:
a buffer adapted to receive image data for the image, the image data comprising a first set of pixels;
an image processing unit configured to define first, second, third, and fourth sub-frames comprising a second set of pixels, wherein each of the second set of pixels is centered on a respective one of the first set of pixels; and
a display device adapted to alternately display the first sub-frame in a first position, the second sub-frame in a second position spatially offset from the first position, the third sub-frame in a third position spatially offset from the first position and the second position, and the fourth sub-frame in a fourth position spatially offset from the first position, the second position, and the third position.
14. The system of claim 13 wherein the first set of pixels comprise a plurality of pixels at a first resolution, and wherein the second set of pixels comprise a plurality of pixels at a second resolution less than the first resolution.
15. The system of claim 13 wherein the image processing unit is configured to generate a third set of pixels for a simulated image by convolving each of the second set of pixels with at least four other pixels from the second set of pixels.
16. The system of claim 15 wherein the image processing unit is configured to generate an error image by subtracting the simulated image from the image data, and wherein the

image processing unit is configured to generate fifth, sixth, seventh, and eighth sub-frames using the error image and the first, the second, the third, and the fourth sub-frames.

17. The system of claim 16 wherein the image processing unit is configured to generate first, second, third, and fourth correction sub-frames from the error image, wherein the image processing unit is configured to generate the fifth, the sixth, the seventh, and the eighth sub-frames by multiplying each of the first, the second, the third, and the fourth correction sub-frames by a sharpening factor and adding the first, the second, the third, and the fourth sub-frames to the first, the second, the third, and the fourth correction sub-frames, respectively.

18. The system of claim 15 wherein the image processing unit is configured to generate a plurality of error data values by subtracting the simulated image from the image data, wherein the image processing unit is configured to generate an error image by convolving each of the error data values with eight adjacent error data values, and wherein the image processing unit is configured to generate fifth, sixth, seventh, and eighth sub-frames using the error image and the first, the second, the third, and the fourth sub-frames.

19. The system of claim 18 wherein the image processing unit is configured to generate first, second, third, and fourth correction sub-frames from the error image, wherein the image processing unit is configured to generate the fifth, the sixth, the seventh, and the eighth sub-frames by multiplying each of the first, the second, the third, and the fourth correction sub-frames by a sharpening factor and adding the first, the second, the third, and the fourth sub-frames to the first, the second, the third, and the fourth correction sub-frames, respectively.

20. A system for generating first, second, third, and fourth sub-frames for display at spatially offset positions to generate the appearance of an image, the system comprising:
means for receiving image data corresponding to the image;
means for generating the first, the second, the third, and the fourth sub-frames using the image data, each of the first, second, third, and fourth sub-frames comprising a plurality of sub-frame pixel values that correspond to a plurality of sub-frame pixels wherein each of

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the plurality of sub-frame pixels are centered with respect to a respective one of a plurality of pixels of the image data;

means for calculating a plurality of simulated image pixel values for a simulated image by convolving each of the sub-frame pixel values with at least four other sub-frame pixel values; and

means for updating the first, the second, the second, the third, and the fourth sub-frames in accordance with a difference between the simulated image and the image data.

21. The system of claim 20 further comprising:

means determining the difference between the simulated image and the image data.

22. (Canceled)

23. The system of claim 20 wherein the means for calculating includes means for calculating the plurality of simulated image pixel values for the simulated image by convolving each of the sub-frame pixel values with at least eight other sub-frame pixel values.

24. The system of claim 23 further comprising:

means for generating a plurality of error data values by subtracting the plurality of simulated image pixel values from the image data; and

means for calculating a plurality of correction pixel values for an error image by convolving each of the error data values with at least eight other error data values.

25. The system of claim 24 further comprising:

means for updating the first, the second, the second, the third, and the fourth sub-frames by generating fifth, sixth, seventh, and eighth sub-frames from the error image and a sharpening factor and adding the fifth, the sixth, the seventh, and the eighth sub-frames to the first, the second, the third, and the fourth sub-frames, respectively.

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26. A computer-readable medium having computer-executable instructions for performing a method of generating sub-frames for display at spatially offset positions to generate the appearance of an image, comprising:

receiving image data corresponding to the image;

generating first, second, third, and fourth sub-frames based on the first image such that each pixel in each of the first, the second, the third, and the fourth sub-frames is centered with respect to a respective pixel in the first image;

generating a simulated image by convolving the first, the second, the third, and the fourth sub-frames with an interpolating filter that comprises a first set of filter coefficients; and

updating the first, the second, the third, and the fourth sub-frames in accordance with a difference between the simulated image and the first image.

27. The computer-readable medium of claim 26 wherein the first set of filter coefficients comprise first, second, and third rows which each comprise three coefficients, wherein the three coefficients of the first row have values of $1/16$, $2/16$, and $1/16$, respectively, wherein the three coefficients of the second row have values of $2/16$, $4/16$, and $2/16$, respectively, and wherein the three coefficients of the third row have values of $1/16$, $2/16$, and $1/16$, respectively.

28. The computer-readable medium of claim 26 wherein the first set of filter coefficients comprise first, second, and third rows which each comprise three coefficients, wherein the three coefficients of the first row have values of 0, $1/8$, and 0, respectively, wherein the three coefficients of the second row have values of $1/8$, $4/8$, and $1/8$, respectively, and wherein the three coefficients of the third row have values of 0, $1/8$, and 0, respectively.

29. The computer-readable medium of claim 26 having computer-executable instructions for:

generating an error image by subtracting the simulated image from the image data.

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30. The computer-readable medium of claim 29 having computer-executable instructions for:

generating first, second, third, and fourth correction sub-frames from the error image;
and

generating fifth, sixth, seventh, and eighth sub-frames by adding the first, the second, the third, and the fourth correction sub-frames to and the first, the second, the third, and the fourth sub-frames, respectively.

31. The computer-readable medium of claim 26 having computer-executable instructions for:

generating an error image by subtracting the simulated image from the image data to generate error data and by convolving the error data with an error filter.

32. The computer-readable medium of claim 31 wherein the error filter comprises an error filter with a second set of filter coefficients, wherein the second set of filter coefficients comprise first, second, and third rows which each comprise three coefficients, wherein the three coefficients of the first row have values of $1/16$, $2/16$, and $1/16$, respectively, wherein the three coefficients of the second row have values of $2/16$, $4/16$, and $2/16$, respectively, and wherein the three coefficients of the third row have values of $1/16$, $2/16$, and $1/16$, respectively.

33. The computer-readable medium of claim 31 having computer-executable instructions for:

updating the first, the second, the second, the third, and the fourth sub-frames by generating fifth, sixth, seventh, and eighth sub-frames from the error image and adding the fifth, the sixth, the seventh, and the eighth sub-frames to the first, the second, the third, and the fourth sub-frames, respectively.

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(J) EVIDENCE APPENDIX

None.

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(K) RELATED PROCEEDINGS APPENDIX

None.